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THE SIXTEENTH OR 1946 ANNUAL INSECT POPULATION SUMMARY OF KANSAS[1]

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The insect population summary for Kansas covers the calendar year 1946 and is the sixteenth in a continuous series which began with the year 1931.[4] The information recorded here is based on a summary of 298 questionnaires of the score card type from the sources indicated in Table I together with the observations and comments of the authors, their colleagues and of those returning the score sheets.

TABLE I.

Sources and Numbers of Questionnaires Summarized for This Report.

	No. in July	No. in October
Group 1. Entomologists in the State	11	8
Group 2. County Agriculture Agents	73	67
Group 3. Farmers, mostly college graduates	11	12
Group 4. Vocational Agriculture Teachers	30	60
Group 5. Agronomists and Horticulturists	12	14
Total reports of each group	137	161
Grand total of all questionnaires summarized for this report	298	

Summary of Weather Conditions (Fig. I and Table II) in Kansas by Months During 1946[5]

January was exceptionally wet over nearly all the eastern part of Kansas and exceptionally dry in the western counties. It was one of the mildest Januarys on the state's record and averaged seven degrees milder than December preceding. There was about the usual amount of sunshine. In the western counties, wheat made little or no growth and was in a precarious

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[1]Contribution No. 553 from the Department of Entomology.

[2]Entomologists of the Kansas Agricultural Experiment Station.

[3]Extension entomologist, Extension Division.

Recognition and appreciation for assistance given during the preparation of this summary are due to the same sources and largely to the same individuals who supplied information for recent, previous reports.

[4]For the other summaries in this series, see the Journal of the Kansas Entomological Society for the summaries for 1931 (vol. 5); 1932 (vol. 6); 1933 (vol. 7); 1936 (vol. 10); 1937 (vol. 11); 1939 (vol. 13); 1942 (vol. 16); 1943 (vol. 17); 1944 (vol. 18); and for 1945 (vol.19); and the Transactions of the Kansas Academy of Science for 1934 (vol. 38); 1935 (vol. 39); 1938 (vol. 42); 1940 (vol. 44) and for 1941 (vol. 45).

[5]Notes and Table II based on Climatological Data: Kansas Section Weather Bureau, U. S. Dept. of Commerce by S. D. Flora. Vol. 60, 1946. See also Kansas Weather by S. D. Flora, Trans. Kans. Acad. of Science 49(4): 367-377, Mar. 1947.

TABLE II.

Summary of Weather Data for the State of Kansas for the period September 1, 1945, to December 31, 1946.

From U. S. Weather Bureau, Kansas Section, Vol. 60.

Month	TEMPERATURE IN DEGREES FAHRENHEIT					PRECIPITATION IN INCHES					
	State Mean	Maximum	Minimum	Mean for 58 years	Departure from normal	State Average	Average for 58 years	Departure from normal	Eastern third	Middle third	Western third
1945											
September	69.2°	108°	22°	69.7°	—0.5°	4.89	2.84	+2.05	7.84	5.04	1.79
October	57.4°	93°	14°	57.3°	+0.1°	0.81	1.95	—1.14	0.97	0.87	0.60
November	45.8°	88°	0°	43.3°	+2.5°	0.15	1.25	—1.10	0.33	0.06	0.06
December	27.5°	72°	—24°	33.0°	—5.5°	0.81	0.89	—0.08	1.11	0.88	0.45
1946											
January	34.4°	77°	—3°	30.0°	+4.4°	1.24	0.70	+0.54	2.47	0.98	0.27
February	41.9°	82°	4°	33.4°	+8.5°	0.77	0.99	—0.22	0.95	0.67	0.77
March	52.5°	97°	10°	43.6°	+8.9°	2.21	1.47	+0.74	2.86	1.98	1.80
April	60.4°	97°	22°	54.8°	+5.6°	1.64	2.68	—1.04	3.06	1.27	0.58
May	60.5°	94°	23°	63.8°	—3.5°	3.44	3.80	—0.36	3.53	3.36	3.43
June	75.8°	113°	39°	73.8°	+2.0°	3.16	4.02	—0.86	4.27	2.54	2.68
July	81.3°	111°	50°	79.2°	+2.1°	1.85	3.12	—1.27	1.30	2.23	2.03
August	77.8°	114°	41°	78.0°	—0.2°	2.97	3.18	—0.21	4.17	2.80	1.94
September	68.9°	107°	27°	69.7°	—0.8°	3.66	2.86	+0.80	4.27	3.80	2.99
October	58.4°	92°	25°	57.3°	+1.1°	4.22	1.99	+2.23	2.99	3.81	5.87
November	42.9°	77°	5°	43.3°	—0.4°	2.56	1.27	+1.29	2.34	2.29	3.05
December	38.7°	78°	—12°	33.1°	+5.6°	0.57	0.89	—0.32	1.26	0.42	0.04
Averages, totals or extremes for 1946	57.8°	114°	—12°	55.0°	+3.33°	28.29	26.97	+1.32	33.47	26.15	25.45

condition, with the soil so dry that there was great danger of soil blowing.

February was an exceptionally mild, sunshiny month for the time of the year and over the northern half of the state was exceptionally dry. It completed a five-month period which in the western two-thirds of the state averaged the driest that had occurred this time of the year since the winter of 1934-35. Most of the northern half of the state had less than half an inch of precipitation. The deficiency was especially noticeable over the northwestern counties. It was a favorable month for farm work. Seeding oats was more than half completed in the south central and southeastern counties and well under way elsewhere. Some gardens were started in the Kaw Valley and fields of potatoes were planted. There was no zero weather in February.

March was exceptionally mild, with generally abundant rains and ample sunshine making it a very favorable month for crop growth over the state. Vegetation, especially fruit, was forced almost a month in advance of the season. January, February, and March of 1946 made the mildest three-month period in the state since the state-wide record was begun in 1887. March afternoon temperatures of 70° or higher were frequent, and freezing at nights was rare. March 31 was the warmest day with temperatures of 90° or higher in almost every part of the state with a high of 97° across the central belt. Wheat was jointing in some fields, oats came up with excellent stands, the commercial crop of potatoes was planted under favorable conditions, alfalfa and pastures were well in advance of the season, and all fruit trees, except apples, were in full bloom.

April came very nearly being a record-breaker for continued mild weather, with decidedly deficient rainfall over practically all the state except the eastern counties. This completed a four-month period that averaged the mildest ever recorded in the state for the time of the year. All crops were from three to four weeks ahead of the season as a result of the extended mild weather. Wheat was in the boot by the close of the month, with fields of early varieties heading out in the southern counties. The crop was needing moisture and was deteriorating steadily in southwestern and west central areas. Corn planting was nearly completed in southern and eastern counties and getting underway elsewhere. The first crop of alfalfa, which made a fine growth, was being cut. Pastures were excellent in the eastern counties but were suffering from lack of moisture in the western. Damage by frost during the month was very small, being confined mostly to grapes and strawberries.

May was a month of good rains throughout the state except for many dry spots in the eastern counties at the close of the month. The month was abnormally cool with a damaging freeze over the western half on the 11th. With the exception of this freeze it was a favorable month for wheat. In many of the extreme southern counties it was nearing harvest by the last of the month. Corn made a good, though rather a slow, growth. Warm weather the closing day of the month greatly helped it, especially in the eastern counties. The first cutting of alfalfa was made. Pastures grew well.

June was the warmest experienced in Kansas in ten years. Rainfall was below normal in the western two-thirds of the state and southeastern counties. Sunshine averaged normal. While some severe storms occurred and

damaged wheat and corn, the number and damage were less than usual for June. Hot dry weather near the middle of the month was trying on growing crops, but wheat ripened fast and filled well. Harvest began earlier than usual. Most of the oats crop was cut. The crop was a good one. Corn made excellent growth. Alfalfa and pastures grew well.

July was the hottest and driest July Kansas had experienced during six years. The rainfall was unevenly distributed over the state. Monthly totals of from three to five inches occurred over most of the north central and northwestern counties, while the southern half and a number of counties in the southwestern and northeastern parts of the state were in the grip of a severe drought, with monthly totals of less than half an inch in many places. The dry hot weather caught corn at a critical period of its growth, while it was silking and tasseling; the crop deteriorated the latter part of the month, especially in the southern and eastern counties. Pasture, alfalfa, and grain sorghums also made slow growth.

August was a month of torrential rains for local areas in the northeast quarter of the state during the second week. The first 17 days of the month were abnormally hot, while the closing week was exceptionally cool.

Corn and grain sorghums were badly damaged by hot weather the fore part of the month. Pastures and alfalfa improved materially the last two weeks. Seed beds had been prepared and in many western counties drilling wheat was underway.

September was a month of generous rains and warm weather over most of the state. It was favorable for crop growth and fall seeding.

October was the third wettest October on record for Kansas. Over the western third, where totals of five to seven inches were common, it was the wettest October on record. The only parts of the state that remained persistently dry were the southeastern counties. It was an excellent month for the early fall growth of wheat, and by the end of the month the crop covered the ground as seen from the roadside.

Husking corn was well under way. Alfalfa and grass pastures made a good growth. Soybean harvest was well advanced in the eastern counties.

November was a month of unusually heavy snow (8 to 10 inches) in the western part of the state, generous rains in almost all sections of the state and mild temperatures. The western third received more precipitation than has been recorded in any other November in 60 years, except one. Since the month followed the wettest October on record in that part of the state the soil was thoroughly soaked. While the northeastern counties received less than normal amounts of rainfall, the moisture was sufficient for current needs. It was a favorable month for wheat, which as a rule covered the ground and had sufficient moisture to carry it through the winter. Farm work was hampered by muddy fields the fore part of the month. The latter part of the month was favorable for corn husking and for combining and threshing grain sorghums.

December was a month of warm, dry, and windy weather. It was generally favorable, however, for agriculture and livestock, except for the last four days, when the temperature dropped to as much as 23 degrees below normal.

While the monthly precipitation was below normal, the moisture was received at an opportune time and crops were in favorable conditions for the beginning of the new year.

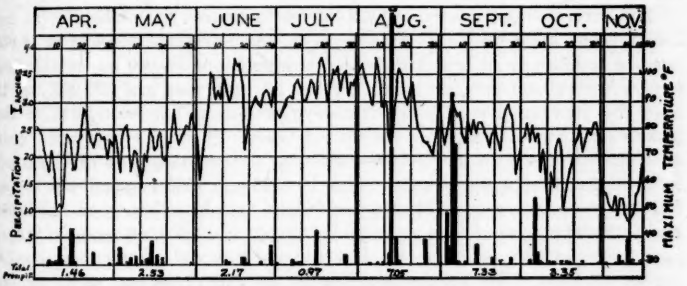

Fig. 1. Daily rainfall and temperature chart for the growing season of 1945 at Manhattan, Kansas. Chart prepared by D. A. Wilbur.

CROP PRODUCTION SUMMARY FOR 1946[6]

While the 1946 production of Kansas crops was only 1 percent more than in 1945, 1946 was a good year for crops in Kansas. The farm value of the 1946 crop production, $618.292,000, was the highest on record. It was 22 percent higher than the 1945 value of $505,128,000 and 7 percent higher than the previous record value of $578,126,000 in 1919. The 1946 wheat crop was valued at $396,685,000. The total 1946 wheat crop of 216,768,000 bu. was second only to the 1931 crop of 251,885,000 bu.

While rather favorable conditions were had for seeding of the winter wheat crop in the fall of 1945, dry conditions were encountered in some sections, particularly in the north central area. The crop wintered fairly well, although some damage occurred from soil blowing. Unusually early spring growth was followed by a period of insufficient moisture, but in May the crop was improved by cool weather and rains that enabled the heads to fill well, giving a better than expected yield in many sections.

The hot weather in July and August seriously damaged corn, especially in the southern part of the state. Sorghum development was also retarded, but rains and a late fall enabled the crop to make some late development.

The corn crop is estimated at 63,231,000 bu. compared with 68,563,000 bu. in 1945. The production of all sorghum for grain in 1946 is estimated at 11,488,000 bu. compared with 17,695,000 bu. in 1945. Sorghums for forage totaled 2,083,000 tons compared to 2,273,000 tons in 1945. Production of soybeans is estimated at 2,173,000 bu. compared with 2,350,000 bu. in 1945.

The production of oats is estimated at 40,556,000 bu. compared with last year's light crop of 16,940,000 bu. The barley crop of 5,022,000 bu. compared

[6]From Kansas 1946 Crop Review, Kansas State Board of Agriculture, Statistics Division. Dec. 20, 1946. Mimeographed Release.

with 7,086,000 bu. in 1945 is the smallest crop since 1937. Flaxseed crop was 812,000 bu. compared with 2,851,000 in 1945. Damage from late frost in the northern counties reduced the first cutting of alfalfa, and the summer drought reduced the yields in the southern counties.

The harvested potato crop of 1,632,000 bu. compared with 1,394,000 bu. for 1945 was the third smallest crop since 1868. The harvested acreage of 16,000 was the smallest on record. Alfalfa seed production of 387,000 bu. established a new record and compares with 196,000 bu. last year and 238,000 bu. in 1943, the previous record. For several years Kansas has been first in the production of alfalfa seed in the United States. The red clover seed crop of 57,000 bu. also set a new record exceeding the previous crop of 43,000 bu. in 1945. The production of other crops in 1946 and 1945 respectively are as follows: sweet clover seed 106,000 and 100,000 bu.; lespedeza seed 11,900,000 and 9,000,000 pounds; Sudan grass seed 1,800,000 and 2,600,000 pounds; broom corn 1,800 and 1,800 tons; popcorn 6,240,000 and 9,240,000 pounds; commercial apples 466,000 and 270,000 bu.; peaches 122,000 and 72,000 bu.; pears 122,000 and 124,000 bu.; grapes 3,500 and 4,500 tons.

The estimated honey crop was 3,360,000 lbs. or an average yield of 56 lbs. per colony compared with 2,601,000 lbs. or an average yield of 51 lbs. per colony in 1945. The amount of beeswax for 1946 was 67,000 lbs. compared with 52,000 lbs. in 1945.

DESCRIPTIVE ACCOUNT OF THE MORE IMPORTANT INSECT ACTIVITIES AND CLIMATIC RELATIONSHIPS DURING 1946

Ants maintained a high population during 1946 judging by observations and correspondence. Winged forms of several species prompted the usual large number of inquiries from the public. They were, however, scored as high as 3 in only six counties.

Aphids in general were normal but the species on iris, chrysanthemums, roses, and columbines were more plentiful than usual. In the general report of aphids, 19 counties scored them as high as 3. They occurred chiefly in gardens. They were reported on beets in Hamilton County, on potatoes in Cloud County, and were scored at 4 on apples in Doniphan County.

Aphids on snowball were abundant in early spring over most of the state and continued till blooms formed. They caused much blighting of the blossoms.

TABLE III.

Population summary of the more common and important insects in Kansas for 1946, as indicated by questionnaire score sheets from nearly all counties.

KEY

1. Scarce.
2. Plentiful, but damage was neither noticed nor reported.
3. The species was abundant. Some damage was either seen or reported.
4. Local outbreaks. The species was doing severe damage in certain fields.
5. The species was in general outbreak. The insects were doing their greatest damage or were as plentiful as they ever get in a locality.

	ANTS, HOUSE	APHIDS, PEA	APHIDS, WHEAT	ARMY WORM	BLACKWORM	BLISTER BEETLE	BLISTER, BEETLE	BORERS, TREE	BOT FLY	CABBAGE WORMS	CANKER WORM	CATTLE GRUBS	CHIGGERS	CHINCH BUG	CODLING MOTH	CORN BORER, SW	CORN BORER, EW	CRICKETS, HOUSE	CUCUMBER BEETLE	CUTWORMS	ELM CALLIGRAPHA	FALL ARMY WORM	FALL WEBWORMS	FALSE WIREWORMS	FLEAS	FLIES, CATTLE	GARDEN WEBWORM	GRASSHOPPERS	GRUBS, WHITE	HOUSE FLY	LEAF HOPPERS	MOSQUITOES	RED SPIDERS	ROSE BUGS	SCALE INSECTS	SCREW WORM	SQUASH BUG	STORED GRAIN INSECTS	TENT CATERPILLAR	TERMITES	TOMATO WORM	WALNUT WORM	WHEAT STRAW WORM	WHITE GRUBS	WIRE WORMS
ALLEN	2																								3	1																			
ANDERSON	2																									2	2	2																	
ATCHISON	2		2		4					3	3			1	3	3				2	2					4	4	2	2																
BARBER		1														3										2	3	2	2																
BARTON		3	1								3	2	1	3						2	2					1	4	3	2	2															
BOURBON	2									2	2				3	4	1									3	4	2	2																
BROWN				2										2	2					2	2					1	4	3	2	2															
BUTLER		3	3	2	1	2	3	2	2			2		2		4	2		3	1						2	4	3	1	2	2	3	1	2	2	2	2	2	2	1	2	2	2	2	1
CHASE		2			3	2	1	1	2	2	1	2	2	3	3	3	1	3								1	4	3	3	2	2	3	1	2	2	2	2	2	2	1	2	2	2	2	1
CHEROKEE																																														
CLARK				2	1						3	3	2													4	5	4	3	2	1					3	1	3	3	1					
CLAY		3		2	1	1	2	3						3			1	3	1	3						3	4	2	4	2	3	1					3	3	2						
CLOUD		2	1		2	1	1	2	2	2	1	1	2	3			2	2	2	3	2					3	4	2	2	2	1	2				3	1	2	1			3	2	1	
COFFEY			3	1	1	3	2		1	2	2	1	2	3	2	3	1	2	1	1	3					1	3	2	3	1	2	1	1			3	2	1	1						
COMANCHE																																														
COWLEY	2	3	2	1	2	1	2	2	2	1	1	3	2	3	4	3	4	3	1	3	2					2	3	4	3	2	2	3		3	1	1	2	1	1					
CRAWFORD	2	2			3	1	2	2	2	1	1	2	2	3			3	2	2	2		1	3			2	3	2	3	1	2	2	1		2	1	2	2	2	1	2	2	2	2	
DECATUR	2	3	1	2	1	3	2	2	1	2	2	3	1	1												2	4	4	3	3	2	1	1	2	2	1	3	2	2	1	2	2	2	2	
DICKINSON	1	4	2	1	2	2	3	3	3	3	3															3	4	3	4	3	4	3	3												
DONIPHAN	2		3	1	2	3	2	1	2	3	2	3	3	4	1	3	3	3								3	4	3	3	2	3	3	2	3	2	1	3	2	1	1				
DOUGLAS					3		2		2		2		1	3		4	3	3	3							1	3	4	3	1	2													
EDWARDS															4																														
ELK												1	2	3																															
ELLIS	2	3			2	1	1	2	2	2	2	3	3	1		1	2	2	2	2						2	3	3	1	2	2	3	1	2	3	1	2	3	1					
FINNEY	2	3	1	3	1	2	1	2	2	2	2	2	2	3	3	4	2	2	1	3	2					2	3	4	1	3	2	2	1	2	2	1	2	2	2					
FORD																																													
FRANKLIN																																													
GEARY	2				1	2		1	2	2	2		2	3	2	2	2	1	3							2	4	1	2	3	2	2	1		3	2	2	2						
GOVE																																													
GRAHAM		2			1	2	1	2	3	2		3	2	1	2	1	2	1		2	1	2	2			2	2	1	3	2	2	1				2	1	3		2	2	1			
GRANT																																													
GRAY																																													
GREELEY																																													
GREENWOOD	2	3	2	1	3	1	3	2	2	1	2	3	4	1	1	3	3	2	2	1						2	4	2	5	3	2	2	2	1	3	2	2	1	2	2	2	2	
HAMILTON																																													
HARPER	2				1	2	2	3	2	1	2	2	2	3	3	2	3	2	3	3	2					2	4	3	4	2	2	2	2	1	2	2	2	2	2	2	2	2	2	
HARVEY	2	1	2	2	2	1	1	2	2	2	2	2	3	3	3	2	3	3	3	2	2	1	1			2	3	4	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	
HASKEL																																													
HODGEMAN	2	2	1			3	2			3	3					3	2	4		3	2	4	1	3	1	4	4	2	2	3	1					3	2	2	3	1	1			
JACKSON	2				2	4	2	2	3	1		3	4		3	1	2	4	1							2	4	3	4	4	3	3					3	2	2	3	1	1			
JEWELL	1	1	2	1	2	1	1	2	2	2	2	3	3	2	3	3	2	2	2	1						2	3	4	2	2	1					2	2	2	3	2	3	3	1	3	1	2
JOHNSON	2	4	2	3	2	1	2	3	1			3	3	3	2	1	3	2	2	1		2	3	3	1	4	4	3	3	3	3	3	3	3	3	3	3	3	2	2	1	3	2	
KEARNY	2																									1	4	2	1																
KINGMAN	2	3	3	1	2	3	2	2	3	3	3	2	1	1	2	2	2	2	1	2	1	2	4	2	3	4	2	3	2	2	3	1	1	3	3	1	3	2	2	2	2	2	
KIOWA																4										3	2	1																
LABETTE	1	3	2					2	1			3	2	2			1	3	2	2						3	1	2	3																
LANE												3	3	4											3	1	5	4	3	1	2	3												
LEAVENWORTH		1	3	3	1	2	2	1				3	3	3	2			3		3						2	4	3	4	3	2	2	3	3	3	3	3	3	1	3	2			
LINCOLN	2									2	3		4	1	3	1	3	3		2	1				2	4	3	4	3	2	2	3	3	3	3	3	3	1	3	2	2		
LINN																																													
LOGAN																										4																		
LYON	4	2	2	4	2	1	2	2	2	2	3	3	2	1	2	1	2	2								1	4	2	4	2	3	2	1	2	3	3	1				1	2	2	
McPHERSON	1	2	1			1	2	2	3	2	2	3	1	2	3	3	3	4	1	2	1	2	5	2	2	4	3	2	3	3		1	2	3	3		2	3	2	1	3	3	
MARSHALL	2	3	1		2	3	1	2	2	1	1	3	2	2	1	2	1	1								2	4	3	4	3	2	2	1	2	3	3	1	2	2	2	2	2	2	
MEADE	2	1	1	2	2	2	2	2	2	3	3	2	2	1	2	2	2	3	2	4	2	2	3	2	4	3	4	2	2	2	2	2	3	2	3	1	2	2	3	3	1		
MIAMI	2	1	4	3	1	2	2	2	2	1	1	3	4	4	3	2	1	3	3							2	4	4	4	2	2	2	2	3	3	1	2	2	3	3	1			
MITCHELL	2				1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					2	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	2	
MONTGOMERY	3			2	2	1	1	2	2	2	2	3	2	1	3	1	2	2	1							1	4	3	4	2	2	3	1	1	2	3	1	2	2	2	2	2	2	
MORRIS		2		2	1	3	3	3	3	3	3							3	1							1	4	2	4	2	2	1	1	3	2	2	1	2	2	2	2	2	2	
MORTON	3																									2	3	3	3	1															
NEMAHA	2			2	1	2	1	3	2	3	3	3	2		2	1	2	3	1							3	2	2	3	3	2	2	2	2	2	1	2	2	2	1	2	2	1	
NEOSHO	2	1	2	1	3	1	2	3	2	3	3	3	3	2	3	2	2	2	2	2	1	2	1			3	3	4	2	2	3	2	2	2	2	2	3	2	3	2	3	2	3	
NESS	2				2	1	2	2	2	3	3	3	3	2	2	2	2	2	2	2	2	2	2			3	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	2	
NORTON	2	2			1	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2			2	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	2	
OSAGE	3	2	2	3	3	1	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2			4	2	4	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	
OSBORNE	2	2	2	1	2	3	1	3	1	3	3	2	2	2	2	2	2	2	2	2	2	2	2			1	2	5	3	2	3	3	3	3	4	2	3	2	2	2	2	2	4	
OTTAWA					3	1	2	2	1	3	3	2	2													3	4	3	3	2	1	2	3	3	2	2	2	2	2	2	2	2	2	
PAWNEE	1	4	4			3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					3	4	3	1	2	3	2	2	2	2	2	2	2	2	2	2	2	2	
PHILLIPS	2	2	2			3	1	3	3	2	1	3	2	1	2	2	2	2	2	2	2					3	4	3	1	3	2	2	2	2	2	2	2	2	2	2	2	2	2	
POTTAWATOMIE	2	2	3	2	2	2	2	2	2	3	3	3	2	2	2	2	2	2	2	2	2					2	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	2	
PRATT	2	3																								3	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	2	
RAWLINS					3		2		2		2		2	2	3											3	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	2	
RENO	2	2	2	1	1	3	3	2	2	2	2	3	3	4	3	2	2	3	3	1	1	2	2	2	2	3	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	
REPUBLIC								2	2	2	2	2	3	3	2	2	2	2	2	2	2					3	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	2	
RICE												3	3	3	2	3											4	2																
RILEY	3	1	3	2	1	1	3	4	2	2	2	2	2	1	4	2	3	3	3	2						3	4	2	4	3	3	3	4	1	2	4	2	3	3					
ROOKS								2							3	2										3	4	3	2															
RUSH	2	3	1		2	2	3	2	3	1	3	2	1		2	3	4	2	1	2	1					2	4	3	4	2	2	3	1	2	3	3	1	2	3	3				
RUSSELL	1	3	2	2		3	2	2	3	2	1	2	2		2	1										2	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	
SCOTT																										2	4	3	3	3	4	3	1	2	2	2	2	2	2	2	2	2	2	
SEDGWICK	2			2		3	3	3	2	2	3	3	4	3	4	2	3	3	3	3	4	2	3	5	2	3	3	2	3	3	2	2	3	2	3	2	3	2	3	2	3	2	
SEWARD	2																									3	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	2	
SHAWNEE	2	1	1	2	1	3	2	2	3	3	3	3	3	3	2	3	2	2								2	4	3	4	2	3	2	2	3	3	1	3	3						
SHERIDAN																																													
SHERMAN				3						3						2										3	1	4	4	4	3	2	1			2		3	1	4	3	2		
SMITH	2	1			3	2	2	2	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	
STAFFORD	2	1	3	2	1	3	3	4	2	3	1	3	2	2	4	4	1	3	3	2	2	2	2	2	2	1	4	3	4	3	2	3	1	2	3	3	1	3	2	1	2	2	
STANTON	2	1	3		3	2	2	2	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	
STEVENS	2	1	3		3	2	2	2	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	
THOMAS					2	1	1	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	
TREGO					3	2	2	2	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	
WABAUNSEE	2			3	3	2	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	
WALLACE				2	2	2	2	3	2	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	
WASHINGTON	2	2	1	3	2	2	2	3	3	1	2	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	
WOODSON	3	4	3	2	3	1	3	3	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	3	4	3	2	2	2	2	2	2	2	2	2	2	2	2	
WYANDOTTE	1	3	2	4	4	4	4	3	3	3	2	3	3	4	3	2	4	2	2	2	3	2	3	4	3	2	4	4	4	3	2	4	3	3	3	4	3	2	3	2	3	2	

The black cherry aphid was common on cherry and plum in nurseries, especially in northeast Kansas.

Aphids on iris, tulips and **columbine** occurred more widespread than ever observed, but nowhere were they particularly destructive. They were somewhat of a curiosity on these plants.

Cabbage aphids were exceptionally plentiful during 1946, and old cabbage stumps in the late fall were heavily infested in Riley Coutny.

Corn root aphids appear to be increasing in the northeast section of Kansas where corn is planted year after year in the same fields. The "blue lice" as they are called by growers, caused heavy losses in many fields in the corn counties along the north border of the state.

Turnip aphids were also more plentiful than usual during the fall.

Green bugs wintered in Kansas as far north as Manhattan and were found widely distributed in wheat fields by R. H. Painter, but natural enemies—lady beetles and parasite **Lysiphlebus**—confined them to small numbers. By early April, it was apparent that green bug would not cause damage to wheat in Kansas but might damage oats. The characteristic green bug damaged spots occurred in many fields in Oklahoma, but no spots were seen or reported in Kansas. The aphids occurred on wheat heads in early May and were reported on oats in Doniphan, Leavenworth, and Lyon counties.

Pea aphids were common, widespread, and caused some damage to garden peas during 1946. They occurred in many alfalfa fields early in April, and by the middle of the month they were abundant around Larned and Medicine Lodge. The alfalfa crop cut for dehydrating left young plants exposed to pea aphids and considerable damage followed.

Pea aphids continued to increase and by early May an outbreak in the southern half of the state appeared certain. Whole fields of alfalfa were infested. Some damage occurred in the Garden City area and in the Arkansas Valley. Growing conditions, however, were excellent and little monetary loss resulted. Damage to stands was seen in Riley, Barton and Pawnee counties in May. If growing conditions had been poor in May, there were sufficient aphids in the fields to have caused widespread damage to stands. W. T. Emery found 10 to 20 c.c. of pea aphids in 20 sweeps with a net only in Saline County, May 8-9, while in nine other counties ½ to 1 c.c. in 20 sweeps occured. Peas were reported to the extent of a scoring of 3 or 4 in Wyandotte, Woodson, and Stanton counties.

Pea aphids were common in alfalfa fields throughout the long favorable autumn. A parental population sufficient for an outbreak in 1947 provided weather conditions were favorable went into the winter.

Bagworms on evergreens continued in 1946 at a high population level. Evergreens in some nurseries were infested, in a few cases severely. Arbor vitae hedges commonly had some bags on the plants. The young bagworms hatched early in June in northern Kansas. They were scored at 4 on cedars in Wyandotte, Shawnee, Atchison, and Lyon counties, at 2 in Cowley County and 1 in McPherson County. They were scored at 1 on sand hill plum in Paw-

nee County. This insect was reported from Wallace, Stevens, Decatur, Finney and Meade counties which is probably a first report of it so far west.

Parasites have been increasing and it is believed that the peak has been passed.

Blister beetles increased slightly in 1946. The striped species damaged alfalfa in spots in fields in Riley, Stafford, Barber, and Finney counties. Blister beetles were scored at 4 on garden plants in Wyandotte and Lincoln counties, at 3 on same in Butler and on alfalfa in Wichita counties, and at 1 to 3 in many counties either on alfalfa or gardens or both.

Bees produced nearly 30 percent more honey in 1946 than in 1945. (See Crop Production Summary, page 46). Beekeepers in southeastern and south central Kansas harvested a poor crop of honey. The crop, however, was more than average in north central Kansas and good in northeast Kansas. Brood-rearing began early and some trouble with swarming was experienced. The nectar flow was cut short by dry weather the middle of June and there were inadequate sources of nectar until the rains of the second week of August. There was a small long drawn-out fall nectar flow but many beekeepers took off too much of the honey because of the demand and high price; probably many colonies went into the winter with inadequate stores. Sweet clover growth was below average.

Borers in trees were widely reported but the damage probably was below average because for much of the year tree growing conditions over the state were good. Borers were reported at 3 in Scott County on elm, ash, and locust, on apple and peach in Greenwood, and ash in Russell counties. They were scored at 2 in Crawford and Seward counties on elms, and elsewhere at 1 to 4 on trees and shrubs in general.

Borers in chrysanthemum stems were reported during September by several correspondents. Borers from Wilson and Johnson counties, Kansas, were cerambycids. The larvae bored downward in the stems causing the stems to die or break off. This condition has not been reported in recent years.

Adults sent in at mid-July from Ellis, Kansas, by Mrs. W. F. Bayles were determined (by comparison) as **Hemierana marginata** (Fab). They were boring in the stems of chrysanthemums and other garden flowers which appears to be an unreported new habit for the species. Mrs. Bayles said the beetles deposited their eggs near the top of the plants and the young hatch inside the stem. She stated they lived in the soil at the roots of the plant until spring and develop into the adult in early summer. The plant is killed.

Botflies on horses attained normal numbers during 1946 and were scored from 1 to 3 over the whole state.

Sheep botflies were quite serious in Lincoln, Mitchell, and Finney counties.

Boxelder bugs which increased during 1946 were pests in homes in the autumn for the first time in several years. The west wall of the first capitol of Kansas at Camp Whiteside was observed the last of September with an exceptionally large number of boxelder bugs on it.

No damage to any plants by these pests was seen or reported during the season.

Cabbage worms do not fluctuate in numbers very much, but in Riley

County they appeared to be slightly less of a problem than normal. The results of the use of DDT powder with its residual effect is likely to give the impression to observers of scarcity of this pest.

Cankerworms continued at the same low level of population as in 1945. Moths first were noted on bands at Manhattan about the middle of February. Emergence increased for the next month but most bands never had many moths on them. Elm leaves came out possibly three weeks early due to an early spring. No important damage was observed anywhere but slight damage was seen at Leavenworth on a few unsprayed apple trees. Spraying of elms was reported necessary at Parsons.

Cattle grubs on native Kansas cattle were less plentiful in 1946 than in 1945, as reported by county agents. The publicity given to its control might lead one to think otherwise since the Extension Service is trying to eradicate the pest from the state. A total of 795,000 head of cattle were treated with derris for grub control during the winter of 1945-1946 and the goal for 1946-1947 is 1,500,000 cattle.

Cattle lice appear to have been more plentiful than in previous years, probably because the application of sprays exposes the lice. There were 16,818 farmers who treated 606,500 cattle for lice in 1946.

Chinch bugs increased slightly during 1946. Adults were observed to be less numerous than for several years in April. They were observed in fair numbers in barley in southeast and south central Kansas in early May. Winter barley in southeast Kansas was somewhat damaged. The first generation nymphs were plentiful. Some barriers were required at harvest time. Some corn was damaged in south central Kansas counties. As usual. the largest populations occurred in the eastern half of the state and the south central portion of this area.

The fall chinch bug survey showed a threatening population in hibernation from Jewell to Sumner counties eastward. The largest numbers occurred in Wyandotte, Leavenworth, Jefferson, Johnson, Linn, Crawford, Neosho, Woodson, Cowley, Butler, Sedgwick, Harvey, Marion, Ellsworth, Dickinson, and Lincoln counties in all of which they were scored at 4.

Clover leaf weevils in alfalfa were virtually absent in 1946. There are no records of their appearance.

Codling moths were as numerous as ever, judging by moth catches in bait traps and stings in unsprayed orchards, but where recommended sprayings were done the control was 10 or 15 percent better than usual, according to R. L. Parker. Control with DDT in several of the standard lead arsenate cover sprays gave 98 percent control.

Colorado potato beetles continued at a low level in 1946 and were still far below usual numbers. Their marked reduction has been an entomological mystery. Some persons think the control with DDT and other new insecticides and destruction of their eggs by lady beetles were limiting factors. No beetles were seen up to mid-April at Manhattan and in many other sections of the state, but later they were seen on some volunteer plants.

Columbine leaf miners (Phytomyza aquilegiae) continued to be as serious a pest on columbine as during the last two or three years. The miners appeared

this season about the last of March or the first of April. Even the first generation caused severe damage.

Common stalk borers (Papaipema nebris) caused injury in the stalks of corn, potato, and tomato plants during the summer in many parts of the state. This species was slightly more plentiful than in 1945.

Corn root worms caused some damage to corn in the corn counties of the state in late July after a wind storm. Injured plants fell to the ground because the roots broke off easily.

Cutworms were more numerous and destructive in 1946 than for several years. Considerable damage occurred in gardens, sweet clover fields and cornfields during April and early May. They cut off garden plants, especially cabbage and tomatoes, worse than for several years. Several species were more plentiful than usual in many parts of the state. They were reported chiefly in gardens and early corn, and they were scored at 1 to 3 chiefly with a 4 in Jackson County.

Large numbers of cutworm moths emerged in southwest Kansas the latter part of April and early May when the honey locust trees were in bloom. They were as severe a house and garage pest as ever occurs there.

Elm calligrapha (C. scalaris) beetles began to emerge the latter part of February and early March. By the second week they were plentiful, and by the middle of March thousands were hiding under the cankerworm bands which had been placed around the trunks of the elms. The beetles deposited eggs on the leaves, buds, and twigs. They were abundant at Manhattan and across the central part of the state. The larvae were fully grown by mid-May. The beetle and larvae caused injury to the elms at McPherson, Abilene, and Manhattan. It was necessary to spray many trees. They also were reported feeding on the leaves of black locust and arborvitae at McPherson. Many of the eggs at Manhattan were parasitized by **Erixestus winnemana** Cwfd. (Microgasteridae) as determined by A. B. Gahan, Bureau of Entomology and Plant Quarantine. Many specimens were sent to C. F. W. Muesebeck. There was only one record of the occurrence of this parasite since its description in 1910.

European corn borer surveys in Wyandotte and Johnson counties (Kansas City, Kansas, areas) disclosed a decided reduction of larvae in 1946. No larvae were found in Wyandotte County and only two larvae each in Johnson County and two in Shawnee County by R. A. Calkins. No larvae were found in the surveys in other Kansas counties.

European elm scale was discovered in St. Francis. It had already developed into a considerable infestation extending for several city blocks. It occurred on both American and Chinese elms.

Scale insects which resembled mealy bugs collected in Colby, were identified by Harold Morrison as the overwintering stage of the scale. Four trees only are known to be infested with this species at Colby.

The infestation at Goodland was reduced by spraying operations in March.

Fall webworms were scarce in Kansas in 1946. A few webs were seen during September but the numbers were below normal. All counties were

scored at 1 or 2 except for 3's in Greely, Wilson, Crawford, and Wyandotte counties.

Fall armyworms were scarce in 1946 but they were reported from all parts of the state. All scores were 1 or 2 except for 3's in Hodgeman and Sedgwick counties.

False wireworms were somewhat more plentiful in the western four or five tiers of counties than in 1945. Rush County was scored at 4 but the other western counties scored these pests at 2 or 3. Damage to sorghum seed was reported in Hodgeman County.

Fruit tree leaf-rollers were common, and during June damaged the foliage of young apple trees in the Kansas City, Kansas, district and at Wathena. Codling moth sprays did not control them. Cocoons were received from Topeka early in May. This species has lately invaded the state and is still uncommon, but it appears to be spreading westward. The light green pre-pupa winters in the grayish-brown cocoons.

Fleas in houses and on pets were widely reported in the state, but it is believed the numbers were no more than average. These pests were scored at 4 in Greely, Stafford, Jefferson, Atchison, and Wyandotte counties, at 3 in 13 counties, and at 2 in 32 counties.

Flies in general were possibly average in numbers throughout the state, which means they were moderately abundant in most parts of the state. They were not in outbreak at any time.

Horn flies were only moderately plentiful in 1946. The first widespread spraying of cattle to protect them from horn flies occurred during 1946; 1,326,000 head of cattle wer esprayed with 0.2 percent DDT with excellent results. Spraying with DDT has now become standard ranch practice.

Horn flies first reached noticeable numbers about April 9 and continued without large peaks until November. They increased following the August and September rains. They have been scored at 5 only in Lane, Osborne, Stafford, McPherson, and Jefferson counties; at 4 in 50 counties; and at 3 in 36 counties.

Houseflies were reported from almost all counties but were below average in abundance. Three counties—Wyandotte, Jefferson, and Shawnee were scored at 3, and 41 counties were scored at 2.

The organized livestock insect control program for 1946 reached almost every county in the state. In 92 counties, there were 241 power spraying machines operating for control of the several insects that attack livestock. Many tons of rotenone-bearing powders and also many tons of DDT powder were used. The control of stable flies, houseflies, and horn flies led the parade; 29,400 farmers treated their barns and out-houses for stable and house flies.

Screw worms were troublesome pests from the latter part of March to November. During this abnormally long period of infestation the peaks occurred in April and September. In the spring, they attacked navels of young animals and dehorning wounds primarily.

A survey in early September showed them to be relatively plentiful from

Kansas City to Manhattan, south to the Oklahoma line. They were mostly in cuts and wounds in cattle and hogs.

Grasshoppers increased somewhat in 1946 but their numbers were well below normal. They were most numerous in some 11 western Kansas counties during September when the state and federal agencies scattered tons of poisoned bait along roadsides.

Grasshoppers hatched a few days before April 6 in the Garden City region. Nymphs of several species were in the second instar by mid-May. The two-striped were observed abundant and doing damage in two garden plots at Oberlin and Kansas City. Definite flights of the lesser migratory grasshopper, **M. mexicanus** were observed by Fred Butcher, Bur. of Ent. and P.Q., in the Garden City region in mid-June and by county agents in September in the western counties. Eggs were deposited before July 1 in that region. The second generation appeared fully two weeks earlier than usual. Damage by grasshoppers was light in central and eastern Kansas and confined to the borders of alfalfa fields. The grasshopper damage to edges of wheat fields in Greely, Wichita, Clark, Lane, Finney, Kearney, Grant and Hamilton counties was severe. The counties of Jefferson, Wyandotte, Shawnee, Johnson and Miami were scored at 4 and 38 other eastern and central counties at 3. It has been determined that the normal population for grasshopeprs in Kansas by analysis of the previous 15 summaries was approximately 3.5.

There was a small partial third generation of **M. mexicanus** in southwest Kansas this year. The late second generation nymphs and early third generation nymphs were found feeding on early planted wheat in 16 western counties.

Carolina adults were reported in some areas in southwest Kansas. Mr. M. W. Smerchek, County Agent of Stanton County, counted as many as 100 per square yard west of Johnson.

Garden webworms were largely confined to the eastern half of the state according to reports, and they were scarce there. This species was scored at 3 on alfalfa only in Neosho, Wilson and Reno counties.

Green striped maple worms (Anisota rubicunda) defoliated many soft maple trees in the southern part of Jefferson County and northern part of Douglas county during July and August.

Hessian fly caused a heavy loss to the wheat crop in several counties in south-central and southeast Kansas by the fall (1945) generation. There also was some damage to wheat in northeast Kansas.

Eggs and larvae were observed April 4, fully two weeks earlier than usual. R. H. Painter found eggs of the fly on March 25 in the variety wheat tests in Rice County, in central Kansas. He also found larvae in the flaxseed stage, April 16, in the Manhattan field tests. E. T. Jones, Bureau of Ent. and P.Q., made a trip April 8 through Riley, Geary, Dickinson, Clay, and Marion counties and some southeastern counties during which he found half-grown larvae. A large percent and in many instances all of the fall infested wheat plants had been killed, despite the warm weather.

This first spring emergence was heavy and many tillers were killed before they began to joint. This resulted in thin stands carrying heads. A number of infested fields were plowed under in May. In most fields the second spring generation was light and occurred high on the stem, causing relatively little lodging. Weather conditions were favorable for wheat growing in central Kansas; and heavily infested fields produced a number of bushels per acre, though much less than more lightly infested fields in the neighborhood. Although fly could be found there was little damage to Pawnee wheat from the insect. There was a large increase in acreage of Pawnee variety. The area of greatest fly injury was in a narrow triangle from Mitchell to Chautauqua and Barber counties, where the loss was estimated at more than 6 million bushels.

Because of the cool fall (1946) a heavy emergence of fly occurred in late August and early September. Volunteer wheat was heavily infested and often killed by the fly. The second generation was scattered and very light in most localities. Where farmers destroyed the infested volunteer there was little evidence of this insect in seeded wheat except in very early planted fields. During this year only a few specimens of hessian fly could be found in fields in the western half of the state.

Iris borers (Macronoctua onusta Grote) were reported in abnormally large numbers on the grounds of St. Benedicts College, Atchison. Specimens in June were thought to be one to three weeks old. A disease killed fully 75 percent of the larvae. They were eradicated by the disease and by hand destruction.

Imbricated snout beetles caused some damage to strawberry plants in northeast Kansas during early April.

Imported currant worms defoliated gooseberry bushes beginning the second week in April.

Japanese beetles were not taken in more than 500 traps operated for a month in eastern Kansas.

Leafhoppers were average in numbers in 1946 and no more plentiful than in 1945. They were scored at 4 on gardens in Ellis and Jackson counties, and at 3 on potatoes, alfalfa and grapes in 14 counties.

Juniper mealy bugs (Pseudococcus juniperi) were wide-spread in the southern part of the state according to H. B. Hungerford. Control was undertaken at Wichita, Pratt, Medicine Lodge, Winfield, and Great Bend. The infestation in Greensburg was eradicated. It reappeared near Greensburg and at Coldwater. It continued to spread in Wichita. DDT has given excellent control. Cedar trees seriously infested were observed at Winfield. It is worst in southwest and central counties.

Lice and Mites on poultry were probably no more numerous than usual in 1946, but publicity campaigns for control emphasized them.

There were more farm people treating poultry for poultry pests than in previous years. There were 20,815 farmers in 97 counties treating their poultry houses and they treated 2,177,940 birds for mites, lice, and bedbugs.

Millipedes were sent in by correspondents for identification more frequently during 1946 than at any time within the memory of the authors.

They were collected crawling on the walls and floors of homes during September and October chiefly. One person said they had been crushed by automobiles in such numbers in central Kansas that the highway had a peculiar oily appearance.

Mites were characterized by abnormally large numbers only of red spider mites and average numbers of other species.

Red spider mites (Tetranychus telarius) severely infested red cedars during the summer throughout nearly all parts of the state. In some areas, the mites spun an unusual amount of web. They also attacked the Arbor vitae in some areas.

Damage also was done to apple, spiraea, various flowers, and to some garden plants, particularly beans. The hot, dry weather of the early summer favored this pest. The mites also constituted a problem on DDT sprayed apple trees in the late summer. This pest was considered in outbreak this year. The mites were scored at 4 on cedars in Wyandotte and Ellis counties, and at 3 in 19 counties mostly on cedars except on elms in Osborne County.

Chiggers were slightly less plentiful and annoying in 1946 than in 1945. In fact they were below normal despite a dry summer.

Mange on hogs was unusually prevalent during the fall of 1946. 3,696 farmers treated 49,160 head of hogs by dipping in lime-sulphur solution for mange.

Mosquitoes were scarce until late summer and early fall when they were in virtual outbreak in many eastern counties. The hot, dry weather in many sections of the state was not favorable to mosquito breeding. Even the salt lakes in Rice County were almost dried up during the summer. But many depressions in fields and along roadsides filled with water during the heavy August rains and several species of pest mosquitoes, notably **Culex vexans, C. tarsalis, and Psorophora cyanescens** became abundant over a large part of Kansas. The heavy rains and overflow of streams during July, August, and September favored them. The adults made evening work in gardens and around shrubbery in Riley County almost impossible by their bites. They continued annoying until mid-October and were present until early November.

Mosquitoes were scored at 4 in Scott and Dickinson counties, with annoyance to cattle and man mentioned from the former county. They were scored at 3 in 27 counties.

Oriental fruit moth larvae caused less injury than last year to peaches in the peach areas, despite the bumper crop. It is present over most of the state and the first or twig generation was about normal, but the second and third generations were scarce. R. L. Parker reported no increase in this insect in south central and southeast Kansas counties.

Rose slugs were abundant in many parts of northeast Kansas and in Riley County where they were scored at 4. This pest is still below average over most of the state.

Sheep ticks were stressed in Extension Service control programs. Their control is important for the native flocks as well as the imported lambs; 2,419 farmers treated 141,460 head by dipping in Cooper's dip and spraying with DDT.

Southern Corn Leaf Beetles (Myochrous denticollis) were reported as abundant by the Shawnee County Farm Bureau agent, injuring young corn plants in June.

Southern Corn Rootworms (Diabrotica duodecimpunctata) were reported injuring corn in northeastern Kansas.

There was more replanting of corn this year than for many years. Wireworms, cutworms, flea beetles, common stalk borers and the two above species were most commonly the cause.

Stored grain insects, according to R .T. Cotton, "In farm-stored wheat in Kansas were rather high this year, doubtless as a result of high moisture conditions. In the course of a survey conducted in one of the largest wheat growing counties in central Kansas in September, infestation in farm bins ranged from 1 to 213 insects per quart sample of wheat, with an average of 34 insects per quart. In these samples, 13 different species of insects were represented. In order of numerical abundance they were the flat grain beetle, cadelle, saw-toothed grain beetle, red flour beetle, small-eyed flour beetle, granary weevil, rice weevil, lesser grain borer, Indian meal moth, foreign grain beetle, hairy fungus beetle, long-headed flour beetle and larger cabinet beetle."

These insects were scored at 4 in Osborne, Stafford, Jefferson and Crawford counties and at 3 in 44 counties. They were reported chiefly in wheat and sorghum seeds.

Southwestern Corn Borer (Diatraea grandiosella) larvae survived the winter of 1945-46 in good condition. In some fields observed by R. H. Painter, larvae were found in all stubble examined. D. A. Wilbur determined that the 1946 infestation was the lightest experienced by Kansas corn growers in the center of the infested area, since the initial outbreak in 1941. Both first and second generation broods were below the 1945 level.

Squash bugs were as abundant in 1946 as in 1945. They were scored at 3 in 10 counties, including areas along all four borders of the state.

Sweet potato leaf beetle (Typophorus viridicyaneous) (Crotch) surveys by L. A. Calkins revealed its presence in early summer in beds in Cowley and Sumner counties. However, this pest seems to have disappeared and market potatoes in September showed no damage.

Tabanids were unusually abundant in Eastern Kansas and caused much torment to cattle and horses. The heavy rains and overflows of streams in several districts during the summer made favorable breeding conditions; several species including notably a black and brown species attained abnormally large numbers. They were particularly plentiful in Wabaunsee and in all counties from Ft .Scott to Wathena.

Tent caterpillars were reported on trees during April at Parsons. They were scored for the season at 4 from Stafford County and at 3 from Pawnee. In general they were below normal and less numerous than in 1945.

Termites were average in numbers in 1946 and no more troublesome than in 1945. They were scored at 3 in 33 counties which included all but the western two tiers of counties.

Tomato horn worms were widely reported in the state but they were

probably not more numerous than in 1945. They were scored at 3 only in 9 counties.

Walnut caterpillars were again at a low level of population in the state. They were scored at 3 only in Sedgwick, Butler, and Neosho counties.

Wheat stem maggots (Meromyza americana) were reported injuring wheat in Washington and Rush counties during the late spring.

The **wheat strawworm** was more abundant in Kansas in the 1945-46 wheat crop than in the previous crop or than normal.

White grubs were more abundant and destructive during 1946 than for two or three years. They were particularly destructive in the late spring. They were reported doing damage near Bennington in mid-April. Adults of **Phyllophaga crassissima** and **P. rugosa** appeared at Manhattan during mid-April which was fully two weeks earlier than usual. The adults were reported eating the foliage of hollyhocks at this time.

Cyclocephala immaculatus grubs were abundant and caused injury to wheat throughout west Kansas on fall sown wheat. While fallowing is a recommended control, they were present in some fallowed ground. The adults were observed eating the foliage of beans. This is a new and previously unreported feeding habit.

This insect injured wheat in several of the western Kansas counties. It was scored at 4 in Rawlins, Pawnee, Ellis, and Thomas counties.

Wireworms were more numerous than during the last three years according to H. R. Bryson. They were widely reported in the state but were scored at 3 only in Wyandotte, Crawford, Neosho, Woodson, Riley, Rush and Seward counties. They were scored at 2 in 20 counties. They were reported most frequently damaging corn and sorghum.

SUMMARY AND CONCLUSIONS

The year 1946 was an excellent crop year and generally speaking, a year of predominately pleasant weather. The year opened with mild average temperatures and adequate moisture for four months. May was cold with some moisture, except in the western third of the state. The summer was dry and above normal in temperature. The western third of the state had a larger rainfall during the summer than usual during the summer and fall, which largely accounted for the splendid harvested wheat crop and the exceptional stand of fall sown wheat. The autumn was mild and moisture conditions were generally satisfactory. The year had the longest growing season in the history of the state. It extended from March 15 to November 11. December was warm and dry.

The yields of all crops except corn and potatoes in 1946 compared favorably with the yields of 1945, both of which were excellent crop years.

The following insects and related forms occurred in **outbreak** numbers (scored at 5) during 1946; none, but mosquitoes in September in many localities in Eastern and Central Kansas and red spiders in the Eastern fourth of the state approached outbreak numbers.

The following species, with those listed under outbreaks, were **more numerous** in 1946 than in 1945: aphids on chrysanthemums, columbines, cabbage, turnips, and roses, blister beetles, box elder bugs, chinch bugs, columbine leaf-miner, common stalk borer, corn root aphids, cutworms, **European** elm scale, false wireworms, fruit tree leaf-rollers, grasshoppers, garden webworms, hessian fly, iris borers, millipedes, stored grain pests, tabanids, wheat straw worm, white grubs, and wireworms.

The following species were **as plentiful** and destructive in 1946 as in 1945: ants, aphids on apples (Doniphan county), cherry and plum seedlings, bagworms, bot flies, codling moth, corn root worms, fleas, green striped maple worms, leafhoppers, juniper mealy bug, lice and mites on poultry and hogs, sheep ticks, squash bugs, termites, tomato horn worms, wheat stem maggots, **Cycocephala immaculatus.**

The following species were **less plentiful** and destructive in 1946 than in 1945: elm calligrapha, green bug, pea aphids, borers, cabbage worms, canker worms, cattle grubs, cattle lice, horn flies, house flies, screw worm flies, chiggers, oriental fruit moth, rose slugs, southwestern corn borer, tent caterpillars.

The following species were **scarce or absent** in 1946: Clover leaf weevils, Colorado potato beetle, European corn borer, Japanese beetle, fall webworms, fall armyworms, walnut caterpillars and other datanas.

SOME NEW SPECIES OF DELPHACODES (Continued) WITH TWO OLD ONES

(Homoptera, Fulgoridae, Delphacinae)

R. H. BEAMER*
Lawrence, Kansas

Delphacodes fallax Muir

Delphacodes fallax Muir, F., Bull. Exp. Station Hawaiian Sugar Planters Association. No. 18, Aug. 28, p. 33, 1926.

Brachypterous Form:

Resembles **D. fulvidorsum** (Metcalf) but elytra of male reaching tip of abdomen, genital capsule black on dorsum and aedeagus with lateral tooth at apex. Length ♂ 2 mm.; ♀ 2.2 mm.

Structure: Front slightly less than three times as long as wide, almost parallel margined, sides feebly converging on either end, distinctly tricarinate; crown almost as wide between eyes as long, definitely carinate; elytra widest near middle with apices broadly rounded, veins raised, in male reaching to tip of abdomen, in female covering next to last segment

Color: General ground color stramineous; in female ovipositor and sheath usually dark, sometimes ventral segments of abdomen more or less infuscated; in male elytra and abdomen, except large basal spot and dorsum of anal segment, black.

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*Contribution from the Department of Entomology, University of Kansas.

Genitalia: In lateral view anal segment with pair of large straight sword-shaped processes; aedeagus widest at base, about four times as long as basal width, almost straight, with a pair of lateral, retrorse, apical teeth, each almost as long as apical width of shaft; styles long, bent dorsally near base, apical third slightly curved caudally and tapered to rounded apices.

Holomorphotype ♂, allomorphctype ♀, 4 ♂ and 1♀ paramorphotypes, Brownsville, Tex., Dec. 29, 1945, R. H. Beamer; other paramorphotypes: 3 ♂ ♂ and 9 ♀ ♀, same place and collector, Dec. 27, 1945.

Macropterous Form:

Like the brachypterous form except elytra extend more than their length beyond abdomen, widest beyond cross veins, claval area often more amber colored and veins beyond cross veins darker.

Allotype ♀ and 4 ♀ parallotypes, Brownsville, Tex., Dec. 29, 1945, R. H. Beamer; swept in Palm Forest. 14 ♂ ♂ were also taken with the same data one of which was compared with the type of **D. fallax** Muir by Doctor Elwood Zimmerman.

Muir described this species from one specimen, a short winged ♂, Belem, Brazil, June, 1924. Now in Bernice P. Bishop Museum, Honolulu, Hawaii.

Delphacodes shermani (Metcalf)

Liburnia shermani. Metcalf, Z. P., Jour. Elisha Mitchell Soc. Vol. 38, p. 207, 1923.

Brachypterous Form:

Resembles D. campestris (VanD.) but both sexes with at least several black spots and male with two short, sharp spines on anal segment. Length ♂ 2.3 mm.; ♀ 3 mm.

Structure: Front with sides almost parallel on basal two thirds, slightly converging near apex, definitely more so on basal third, distinctly though lightly tricarinate; crown about one-third longer than width between eyes, carinae very faint; elytra broadest near middle, almost reaching tip of abdomen in male, ending near middle of abdomen in female, narrowing to rounded apices, semihyaline, veins heavier with sparsely set, long yellow setae, hind wings absent.

Color: General color buff; male with black spot above each coxa; entire front including areas beneath and back of eyes, except small area at base, a narrow dash either side on dorsum near base of abdomen, a broader cross band near middle and all of genital capsule, except extreme dorsum and anal tube, dark; female with black spots above hind and middle coxae and beneath ocelli, tan across front, a small indistinct dark spot on lateral margin of each dorsal sclerite of abdomen, ovipositor sheath darker.

Genitalia: In lateral view male anal segment with two short sharp processes; aedeagus about three times as long as wide, rather rectangular in shape with one strap-like tooth at outer ventral corner and several more or less definite teeth at outer dorsal edge; styles more or less avicephaliform with large head and small beak, in ventral view this head is still more pronounced.

Described from 1 ♂ and 6 ♀ ♀, Raleigh, N. C., in collection of Doctor

Z. P. Metcalf. Redescribed from 140 specimens taken in Douglas Co., Kans., 1945-1946.

Delphacodes canina n. sp.

Brachypterous Form:

Resembles **Delphacodes parvula** (Ball) but definitely smaller, elytra scarcely longer than broad and aedeagus in lateral view not bent ventrally near tip. Length ♂, 2.0 mm.; ♀ 2.5 mm.

Structure: Front about twice as long as wide, widest just before apex, about one third narrower at base than at widest place, definitely tricarinate; crown definitely longer than shortest distance between eyes, carinae faint; elytra of male barely longer than wide, apices rounded, veins raised, elytra of female definitely longer than broad, apices sharper than in male; hind wings in both sexes mere pads.

Color: General color dirty stramineous; female with a variable number of darker spots on lateral margins of last two or three dorsal segments of abdomen; male with dorsum of abdomen more or less fumousely lineate.

Genitalia: In lateral view anal segment large with a pair of very small caudo-dorsal teeth; aedeagus widest on outer third, slightly more than twice as long as greatest width, with four small teeth dorsally at basal third, a much larger one before broadly rounded apex, three smaller teeth on margin between this and opening and three blunt ones near middle of ventral margin; styles pediform with deeply hollowed foot and bifid toe.

Holotype ♂, allotype ♀, 1 ♂ and 9 ♀ paratypes, Santa Rita Mts., Ariz., Aug. 18, 1935, R. H. Beamer.

Macropterous Form:

Like the brachypterous form except with flight wings: Elytra extending about one third their length beyond abdomen, semihyaline with veins darker, widest near region of cross veins, apices rounded. Total length of body and wings ♂ 3.0 mm.; ♀ 3.3 mm.

Holomorphotype ♂, and allomorphotype ♀, Santa Rita Mts., Ariz., Aug. 18, 1935, R. H. Beamer.

Types in Snow Entomological Collections.

Delphacodes caerulata n. sp.

Brachypterous Form:

Resembles **D. alexanderi** (Metc.) but more nearly black throughout, aedeagus straight without teeth at tip and styles slender with avicephaliform apices in lateral view. Length ♂ 2.1 mm.; ♀ 2.3 mm.

Structure: Front almost three times as long as wide, widest a little below the middle, slightly tapered toward each end although in middle region sides almost parallel, distinctly tricarinate; crown barely longer than wide, smooth on anterior half, distinctly carinate on basal; elytra broad reaching about to genital capsule in ♂, in ♀ extending on to 4th abdominal segment,

apices truncately rounded; hind wings reduced to a flap about one fifth size of eye.

Color: General color dark throughout; head, thorax, basal segment of abdomen and border of segment next genital capsule lighter; eyltra, most abdominal segments, and genital capsule except anal tube, coal black.

Genitalia: In lateral view, anal segment with two sharp processes; aedeagus long, widest near middle, sides almost parallel with row of teeth diagonally crossing shaft near middle; aedeagal brace about two thirds as long as style, rounded at apex; styles wide at base narrowed toward aicephaliform apices.

Holotype ♂, allotype ♀, 4 ♂ and 1 ♀ paratypes, Douglas Co., Kans., Aug. 27, 1945, R. H. Beamer; other paratypes: 3 ♂ ♂, Aug. 23, 1945, 2 ♂ ♂, Aug. 22, 1945, same place and collector; 12 ♂ ♂, Lawrence, Kans., Aug. 23, 1944, R. H. Beamer; 1 ♂, Medora, Kans., Aug. 5, 1945, R. H. Beamer; 8 ♂ ♂ Douglas Co., Kans., April 12, 1946, R. H. Beamer; 1 ♂ same place and collector April 16, 1946, and 1 ♂ April 18, 1946; 1 ♂ Lawrence, Kans., Sept. 4, 1944, R. H. Beamer.

Macropterous Form:

Like the short-winged form except eyltra whitish, semihyaline, widest beyond cross veins and extending one third their length beyond abdomen.

Holomorphotype ♂, Cherokee Co., Kans., Aug. 31, 1927, R. H. Beamer; paramorphotypes: 1 ♂, Douglas Co., Kans., Aug. 22, 1945, R. H. Beamer; 1 ♂, same place and collector, Aug. 27, 1945; 1 ♂, Lawrence, Kans., Sept. 4, 1944, R. H. Beamer.

Types in Snow Entomological Collections.

Delphacodes peneparvula n. sp.

Brachypterous Form:

Resembles **D. parvula** (Ball) but posterior margin of male pygofer in lateral view scarcely concave, aedeagus almost straight and aedeagal brace not conspicuous. Length ♂ 2.5 mm.; ♀ 2.8 mm.

Structure: Front about twice as long as wide; widest on apical third, slightly narrowed toward either end, more so toward base, strongly tricarniate; crown about one third longer than basal width, carinae definite on basal half, apex broadly rounded; elytra semihyaline, reaching to about middle of abdomen, apices broadly rounded; rather widely separated on mesal line; hind wings mere pads about one third as large as an eye.

Color: General color stramineous, dorsum more or less lineate with darker; a dark spot below each ocellus, a second above middle coxae in ♀ and a third and larger spot above hind coxae in ♂.

Genitalia: In lateral view; male pygofer very slightly concave on posterior margin; anal segment without processes; aedeagus with sides almost parallel, enlarged at apex with row of about 10 teeth starting on dorsal margin at tip and curving to about ventral margin near middle of shaft, also 6 to 8 teeth on ventral margin on outer third; styles pediform with large heel.

Holotype ♂, allotype ♀, 24 ♂ and 25 ♀ paratypes, Meade Co., Kans.,

Aug. 14, 1945, R. H. Beamer. One paratype Wichita Nat., Forest, Okla., June 26, 1946, R. H. Beamer.

Macropterous Form:

Like the short winged form except both pairs of wings extending about one fourth their length beyond abdomen. Length ♂ 3.8 mm.; ♀ 3.8 mm.

Holomorphotype ♂, Benton, Ky., June 30, 1939, R. H. Beamer; allomorphotype ♀, Sinton, Tex., July 5, 1936, D. R. Lindsay; 1 ♀ paramorphotype, Wichita, Nat., Forest, Okla., June 27, 1936, R. H. Beamer; 1 ♀ paramorphotype, Meade Co., Kans., Aug. 14, 1945, R. H. Beamer.

Types in Snow Entomological Collections.

Delphacodes perusta n. sp.

Brachypterous Form:

Resembles **Delphacodes analis (Crawf.)** but smaller, lacking tooth on ventro-caudal margin of anal segment and outer half of aedeagus pediform. Length ♂ 1.7 mm.; ♀ 2.0 mm.

Structure: Front slightly more than twice as long as wide, widest near middle, slightly narrowed to apex, more so on basal third, definitely tricarinate; crown slightly longer than width between eyes, carinae rather faint; eyltra almost rectangular, broadly rounded at apices, extending to about middle of abdomen in both sexes.

Color: Female stramineous throughout with slightly darker ovipositor and sheath; male dirty grayish brown on head and pronotum to generally black on abdomen, with a large lighter spot on dorsum of abdomen at base and some lighter spots on lateral margins; legs much lighter.

Genitalia: In lateral view anal segment with a broad and short almost double tooth on each side; aedeagus six or so times as long as wide, pediform on outer half, more or less covered on that portion with fair sized teeth; styles widest at base, pediform on outer half.

Holotype ♂, allotype ♀, 55 ♂ and 38 ♀ paratypes, Dunkirk, N. Y., July 20, 1946, R. H. Beamer; other paratypes: 12 ♂♂ and 10 ♀♀, Fredonia, N. Y., July 21, 1946, L. D. Beamer; 8 ♀♀ and 7 ♂♂, Lancaster, N. Y., July 25, 1946, R. H. Beamer; 19 ♂♂ and 9 ♀♀, Rome, O., July 19, 1946, R. H. Beamer.

Macropterous Form:

Like the brachypterous except wings fully developed. Elytra extending at least one third their length beyond abdomen, whitish semihyaline with veins much darker. Both sexes quite dark in general appearance to naked eye.

Holomorphotype ♂, allomorphotype ♀, 28 ♂ and 31 ♀ paramorphotypes, Dunkirk, N. Y., July 20, 1946, R. H. Beamer.

All types in Snow Entomological Collections.

Delphacodes nigriscutellata n. sp.

Brachypterous Form:

Resembles **D. shermani** (Metcalf) but crown black as well as front, scutel-

lum black and female generally without black marks. Length ♂ 2.3 mm.; ♀ 3.0 mm.

Structure: Front slightly more than twice as long as wide, greatest width beyond middle, slightly narrowed toward apex, more so toward base, practically without carinae; crown slightly longer than width between eyes; elytra barely longer than wide, veins raised, apices almost truncate.

Color: General color stramineous; female with ovipositor and sheath slightly darker; male with front, including crown and genae, a large spot above middle coxae, scutellum, broad band across middle of abdomen and genital capsule except anal segment, black; eyltra often embrowned, hyaline with veins darker, also a slightly darker spot above hind coxae.

Genitalia: In lateral view anal segment with a pair of long closely appressed processes; aedeagus broadest at base, about one third as wide as total length, rapidly narrowed at basal third to one third basal width, ventral margin incurved on apical third, apex narrowed and curved ventrally; styles with caudal projection near base, unevenly bilobed on apical third.

Holotype ♂, allotype ♀, 18 ♂ and 52 ♀ paratypes, Douglas Co., Kans., April 18, 1946, R. H. Beamer; other paratypes same place and collector: 15 ♂ ♂ and 10 ♀ ♀, April 24, 1946; 7 ♀ ♀, April 29, 1946; 4 ♂ ♂, April 12, 1946; 1 ♂ May 21, 1946.

Macropterous Form:

Like the brachypterous form but with flight wings. Elytra extending past abdomen by one third their length; widest in region of cross veins, apices rounded, hyaline, veins slightly darker.

Holomorphotype ♂, Meade Co., Kans., Sept. 13, 1944, R. H. Beamer; allomorphotype ♀, and 5 ♂ ♂ paramorphotypes, Douglas Co., Kans., April 18, 1946, R. H. Beamer; 1 ♂ and 1 ♀ paramorphotypes same place and collector April 16, 1946.

Types in Snow Entomological Collections.

This species was collected in Douglas Co., Kans., by sweeping around the edge of a marsh which had a fair stand of **Andropogon furcatus** Muhl. It was not taken in any other stand of this grass although several other locations were swept.

Delphacodes atridorsum n. sp.

Brachypterous Form:

Resembles *D. nitens* M. and G. but smaller, aedeagus bent dorsally almost at right angles and not enlarged at tip. Length ♂ 2.0 mm.; ♀ 2.2 mm.

Structure: Front about a third longer than wide, widest in the middle and narrowed about equally toward each end, with large median carina on apical half, evanescent at either end; crown about as wide as long, broadly rounded at apex, practically without carinae; pronotal carinae barely visible; elytra about as broad as long, barely reaching second abdominal segment, truncately rounded on apices; hind wings practically absent.

Color: Male dark brown to black except antennae, genae, clypellus, beak,

venter of thorax and legs stramineous; female stramineous, ovipositor and ocelli darker.

Genitalia: In lateral view genital capsule about rectangular; anal segment with a pair of long, sharp curved processes; aedeagus widest at base, almost half as wide as long, bent dorsally and strongly tapered on outer two thirds with about 8 teeth near base and 6 on dorsal margin just short of apex; styles widest at base, slightly curved dorsally, apices sharp on ventral margin, in caudal view oval at base with avicephaliform apex with sharp beak on inner margin.

Holotype ♂, allotype ♀, 6 ♂ and 2 ♀ paratypes, Lapine, Ore., July 2, 1935, R. H. Beamer.

Types in Snow Entomological Collections.

Delphacodes sagittata n. sp.

Brachypterous Form:

Resembles **D. parvula** (Ball) but much smaller, no dark markings, with four short processes on anal segment and a more or less sagittate aedeagus. Length ♂ 1.8 mm.; ♀ 2.0 mm.

Structure: Front about one half as wide as long, widest on outer third, definitely narrowed toward each end more so toward base, definitely tricarinate; crown almost twice as long as wide, apex broadly rounded, carinae evident on basal half; elytra semi hyaline, sides almost parallel, apices broadly rounded, extending to about middle of abdomen; hind wings reduced to very small pads about one fourth as large as an eye.

Color: Stramineous throughout. ..

Genitalia: In lateral view anal segment with two pairs of short processes; aedeagus almost three times as long as greatest width, widest beyond middle, most of enlargement on ventral margin, one large sharp tooth on dorsal margin near tip and about five smaller ones on same margin near outer third; styles pediform, heel very large, base deeply concave.

Holotype ♂, allotype ♀, 1 ♂ and 5 ♀ paratypes, Okefenokee Swamp, Ga., July 25, 1939, R. H. Beamer.

All types in Snow Entomological Collections.

Plate I

1. Lateral view of genital capsule of male of **Delphacodes fallax** Muir.
1a. Caudal view of styles and aedeagal brace of **Delphacodes fallax** Muir.
1b. Lateral view of tip of aedeagus of **Delphacodes fallax** Muir.
1c. Dorso-ventral view of tip of aedeagus of **Delphacodes fallax** Muir.
2. Lateral view of genital capsule of male of **Delphacodes nigripennata** Beamer.
2a. Caudal view of styles and aedeagal brace of **Delphacodes nigripennata** Beamer.
2b. Lateral view of aedeagus, enlarged, of **Delphacodes nigripennata** Beamer.
3. Lateral view of genital capsule of male of **Delphacodes silvae** Beamer.
3a. Caudal view of styles and aedeagal brace of **Delphacodes silvae** Beamer.
3b. Lateral view of outer two thirds of aedeagus of **Delphacodes silvae** Beamer.
4. Lateral view of genital capsule of male of **Delphacodes sagae** Beamer.
4a. Caudal view of styles and aedeagal brace of **Delphacodes sagae** Beamer.
4b. Lateral view of aedeagus, enlarged, of **Delphacodes sagae** Beamer.
5. Lateral view of genital capsule of male of **Delphacodes hyalina** Beamer.
5a. Caudal view of styles and aedeagal brace of **Delphacodes hyalina** Beamer.
5b. Lateral view of aedeagus, enlarged, of **Delphacodes hyalina** Beamer.

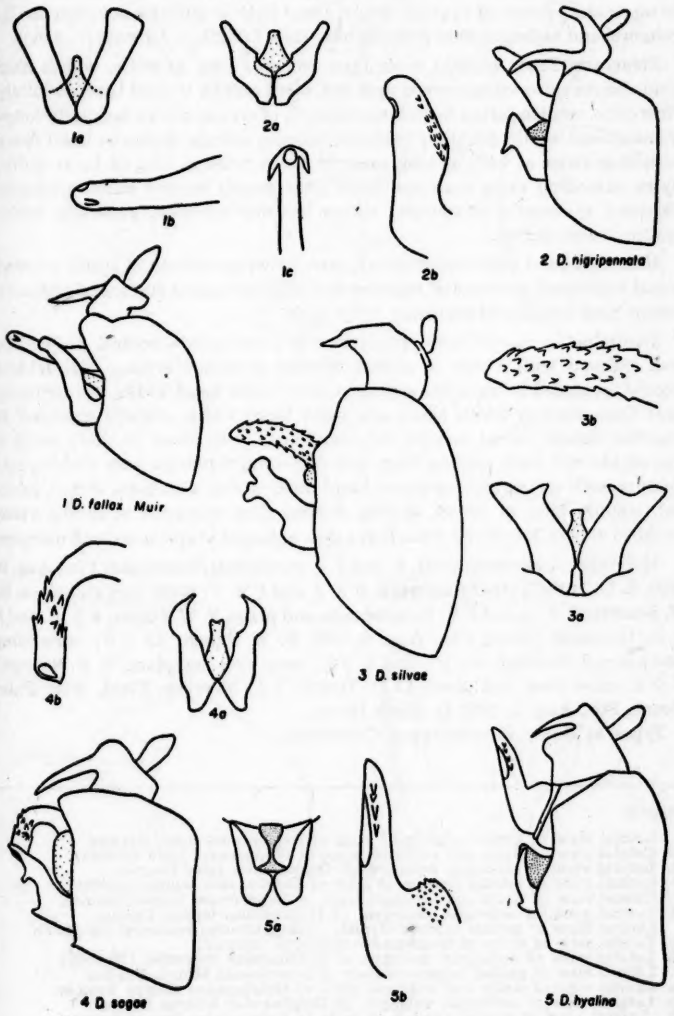
1a
2a
2b
2 D. nigripennata
1b
1c
3b
1 D. fallax Muir
3a
3 D. silvae
4b
4a
5a
5b
4 D. segos
5 D. hyalina

PLATE I

Delphacodes idonea n. sp.

Macropterous Form:

Resembles **Delphacodes wetmorei** M. and G. but much larger, the inturned dorso-caudal portion of pygofer single, about half as wide as same portion in **wetmorei** and aedeagus bent dorsally near base. Length ♂ 3.8 mm.; ♀, 4 mm.

Structure: Front slightly more than twice as long as wide, widest near middle, sides converging toward each end, more rapidly toward base, definitely tricarinate, median carina forked near margin of crown; crown definitely longer than basal width, definitely carinate, anterior margin truncate, basal fovea more than twice as wide as long, anterior fovea twice as long as basal width; elytra extending more than one third their length beyond body, gradually widening to beyond crossveins, apices broadly rounded, generally milky hyaline, veins darker.

Color: General color stramineous, area between carinae of front, a broad dorsal crossband, portions of sternum and most of ventral surface of abdomen except hind margins of segments, very dark.

Genitalia: In lateral view, pygofer with small caudo-ventral projection; anal segment with a pair of almost straight processes arising near middle closely appressed to segment; aedeagus about twice basal width, bent dorsally near base, median width about one third basal width, slightly enlarged to rounded apices; dorsal margin on outer fourth with about 12 sharp teeth, a row of about 6 teeth angling from dorsal to ventral margin near middle, numerous teeth on ventral margin of basal third; styles with sides almost parallel, slightly bifid at apices, slightly shorter than aedeagus in caudal view, knobbed at base, narrowed toward tips then enlarged at apices on both margins.

Holotype ♂, allotype ♀, 11 ♂ and 7 ♀ paratypes, Homestead, Fla., Aug. 9, 1930, L. D. Tuthill; other paratypes: 8 ♂ ♂ and 6 ♀ ♀; same time and place, R. H. Beamer; 2 ♂ ♂ and 6 ♀ ♀, same time and place, P. W. Oman; 4 ♂ ♂ and 6 ♀ ♀, Cocoanut Grove, Fla., Aug. 9, 1930, P. W. Oman; 15 ♀ ♀, same time and place, J. Nottingham; 1 ♂ and 7 ♀ ♀, same time and place, R. H. Beamer; 3 ♀ ♀, same time and place, L. D. Tuthill; 1 ♂, Morrison Field, West Palm Beach, Fla., Aug. 2, 1942, D. Elmo Hardy.

Types in Snow Entomological Collections.

Plate II

6. Lateral view of genital capsule of male of **Delphacodes lutea** Beamer.
6a. Caudal view of styles and aedeagal brace of **Delphacodes lutea** Beamer.
6b. Lateral view of aedeagus, enlarged, of **Delphacodes lutea** Beamer.
7. Lateral view of genital capsule of male of **Delphacodes lappae** Beamer.
7a Caudal view of styles and aedeagal brace of **Delphacodes lappae** Beamer.
7b. Lateral view of aedeagus, enlarged, of **Delphacodes lappae** Beamer.
8. Lateral view of genital capsule of male of **Delphacodes shermani** (Metcalf).
8a. Caudal view of styles of **Delphacodes shermani** (Metcalf).
8b. Lateral view of aedeagus, enlarged, of **Delphacodes shermani** (Metcalf).
9 Lateral view of genital capsule of male of **Delphacodes bifurca** Beamer.
9a. Caudal view of styles and aedeagal brace of **Delphacodes bifurca** Beamer.
9b. Lateral view of aedeagus, enlarged, of **Delphacodes bifurca** Beamer.
10. Lateral view of genital capsule of male of **Delphacodes bocana** Beamer.
10a. Caudal view of styles and aedeagal brace of **Delphacodes bocana** Beamer.
10b. Lateral view of aedeagus, enlarged, of **Delphacodes bocana** Beamer.

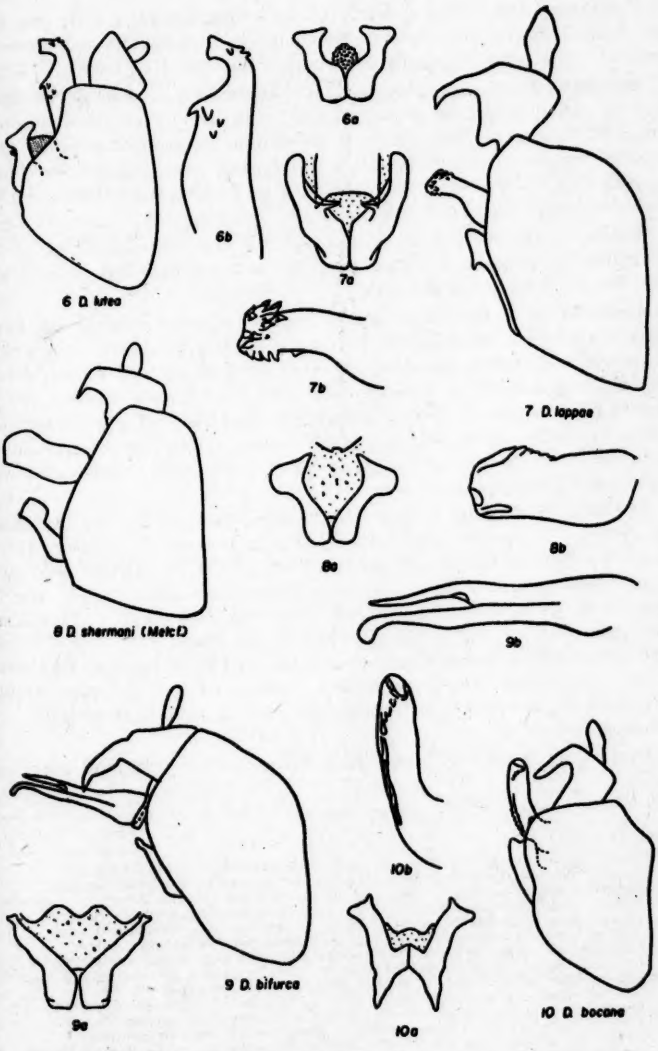
6 D. lutea
6a
6b
7a
7b
7 D. lappae
8 D. shermani (Metc.)
8a
8b
9b
9 D. bifurca
9a
10b
10a
10 D. bocana

PLATE II

Delphacodes angulata n. sp.

Brachypterous Form:

Resembling **Delphacodes caerulata** Beamer but pygofer greatly extended on outer dorsal corner, aedeagus bent dorsally near middle and processes on anal segment bent ventrally on outer half. Length ♂ 2.0 mm.; ♀, 2.5 mm.

Structure: Front slightly more than twice as long as wide, widest about middle, definitely narrowed toward base, very slightly narrowed to apex, distinctly but bluntly tricarinate; crown distinctly longer than broad, apex broadly rounded, carinae distinct; elytra broadly oval, reaching to genital capsule in ♂, to fifth segment of abdomen in ♀; hind wings tiny pads, less than one fourth size of eye.

Color: General color almost black; venter, except abdomen, front, vertex. pronotum, scutellum, dorsal cross band just before genital capsule in ♂ and anal tube in both sexes, lighter.

Genitalia: In lateral view pygofer greatly extended caudally on dorsal margin; anal segment with pair of long, sharp processes arising near middle of ventral margin, bent anteriorly almost at right angles near middle; aedeagus widest at base, bent dorsally near basal third with a diagonal row of about 8 teeth beginning on ventral margin at bend and ending on dorsal margin at beginning of rounded tip; styles widest at base, sinuate, gradually narrowing to a slightly bifid apex, aedeagal brace large, slightly narrowed toward tip, apex slightly concave.

Holotype ♂, allotype ♀, and 4♀ paratypes, Douglas Co., Kansas., April 12, 1946, R. H. Beamer; other paratypes; same place and collector, 4 ♂♂ and 1 ♀, April 18, 1946; same place and collector, 1 ♂, July 25, 1945; same place and collector, 8 ♂♂, Aug. 17, 1944; Lawrence, Kansas., 19 ♂♂, Aug. 23, 1944, R. H. Beamer, same place and collector, 2 ♂♂, Sept. 1, 1944; same place and collector, 4 ♂♂, Sept. 4, 1944; Welda, Kans., 1 ♂, Sept. 17, 1945, R. H. Beamer; Sterling, Kans., 1 ♂, Aug. 4, 1944, R. H. Beamer; Nickerson, Kans., 1 ♂, Aug. 4, 1945, R. H. Beamer. Medora, Kans., 2 ♂♂, Aug. 5, 1945, R. H. Beamer; Aransas Pass, Texas, 2 ♂♂, Jan. 2, 1946, R. H. Beamer.

Macropterous Form:

Resembling the brachypterous form but with elytra and hind wings ex-

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Plate III

11. Lateral view of genital capsule of male of **Delphacodes canina** Beamer.
11a. Caudal view of styles and aedeagal brace of **Delphacodes canina** Beamer.
11b. Lateral view of aedeagus, enlarged, of **Delphacodes canina** Beamer.
12. Lateral view of genital capsule of male of **Delphacodes caerulata** Beamer.
12a. Caudal view of styles and aedagal brace of **Delphacodes caerulata** Beamer.
12b. Lateral view of aedeagus, enlarged, of **Delphacodes caerulata** Beamer.
13. Lateral view of genital capsule of male of **Delphacodes peneparvula** Beamer
13a. Caudal view of styles and aedeagal brace of **Delphacodes peneparvula** Beamer.
13b. Lateral view of aedeagus, enlarged, of **Delphacodes peneparvula** Beamer.
14. Lateral view of genital capsule of male of **Delphacodes perusta** Beamer.
14a. Caudal view of styles and aedeagal brace of **Delphacodes perusta** Beamer.
14b. Lateral view of aedeagus, enlarged, of **Delphacodes perusta** Beamer.
15. Lateral view of genital capsule of male of **Delphacodes nigriscutellata** Beamer.
15a. Caudal view of styles and aedeagal brace of **Delphacodes nigriscutellata** Beamer.
15b. Lateral view of aedeagus, enlarged, of **Delphacodes nigriscutellata** Beamer.

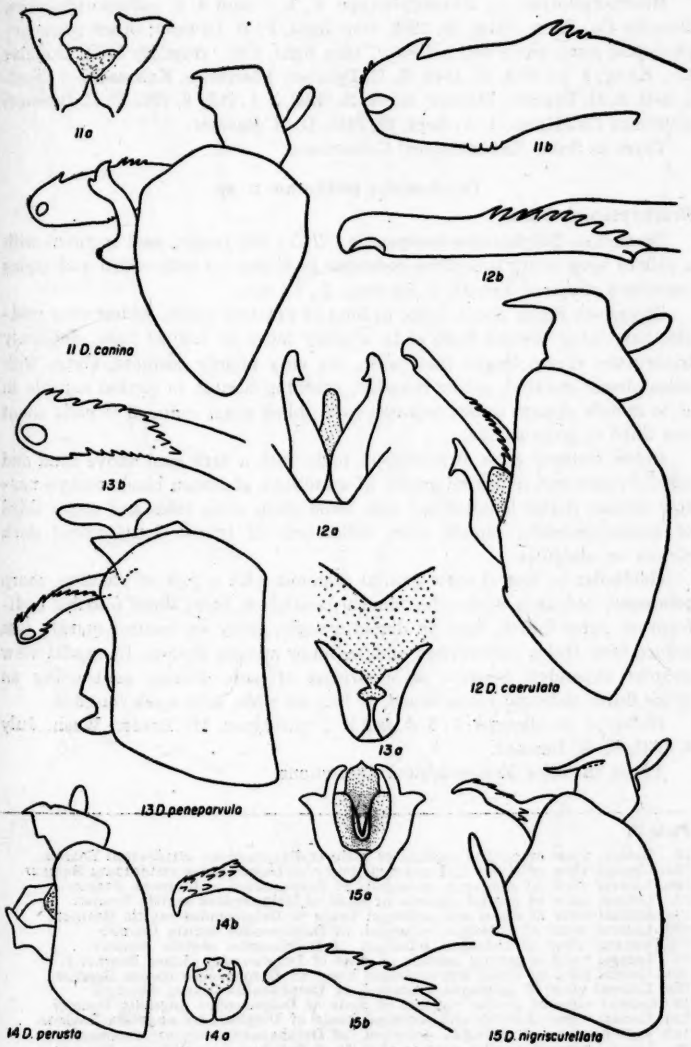
11a
11b
11 D. canina
12b
13b
12a
12 D. caerulata
13a
13 D. peneparvula
15a
14b
14 D. perusta
14a
15b
15 D. nigriscutellata

PLATE III

tending almost half their length beyond end of abdomen and general color usually much lighter.

Holomorphotype ♂, allomorphotype ♀, 6 ♂ and 4 ♀ paramorphotypes, Douglas Co., Kans., Aug. 30, 1938, trap light, P. B. Lawson; other paramorphotypes: same place and collector, trap light, 1 ♂, Aug. 28, 1928; Douglas Co., Kans., 1 ♂, Aug. 22, 1945, R. H. Beamer; Lawrence, Kansas., 1 ♂, Sept. 1, 1944, R. H. Beamer; Medora, Kans., S. Hills, 1 ♂, July 6, 1945, R. H. Beamer; Cherokee Co., Kans., 1 ♂, Sept. 19, 1945, R. H. Beamer.

Types in Snow Entomological Collections.

Delphacodes pediforma n. sp.

Brachypterous Form:

Resembles **Delphacodes campestris** (V. D.) but larger, anal segment with a pair of long, sharp processes, aedeagus pediform on outer third and styles narrowed at apices. Length ♂ 2.8 mm.; ♀, 3.2 mm.

Structure: Front about twice as long as greatest width, widest near middle, narrowing toward both ends, slightly more so toward base, definitely tricarinate; crown longer than wide, not very plainly carinate, elytra with sides almost parallel, apices rounded, reaching almost to genital capsule in ♂ to middle of next to last segment in ♀; hind wings reduced to pads about one third as large as eye.

Color: General color stramineous; male with a dark spot above hind and middle coxae and in lateral angles of scutellum, abdomen black except narrow median dorsal longitudinal line, some spots along sides and upper third of genital capsule; female with indications of lateral longitudinal dark stripes on abdomen.

Genitalia: In lateral view genital segment with a pair of slender, sharp processes; aedeagus with sides almost parallel on basal three fourths, pediform on outer fourth, heel on dorsal margin, spiny on ventral margin just before foot; styles widest near middle, inner margin sinuate. In caudal view pygofer expanded, sunken; styles widest at base, sharply contracting on outer third; aedeagal brace broad, as long as wide, with apex rounded.

Holotype ♂, allotype ♀, 8 ♂ and 8 ♀ paratypes, Mt. Ranier, Wash., July 6, 1935, R. H. Beamer.

Types in Snow Entomological Collections.

Plate IV

16. Lateral view of genital capsule of male of **Delphacodes atridorsum** Beamer.
16a. Caudal view of styles and aedeagal brace of **Delphacodes atridorsum** Beamer.
16b. Lateral view of aedeagus, enlarged, of **Delphacodes atridorsum** Beamer.
17. Lateral view of genital capsule of male of **Delphacodes sagitta** Beamer.
17a. Caudal view of styles and aedeagal brace of **Delphacodes sagitta** Beamer.
17b. Lateral view of aedeagus, enlarged, of **Delphacodes sagitta** Beamer.
17c. Ventral view of aedeagus, enlarged, of **Delphacodes sagitta** Beamer.
18. Lateral view of genital capsule of male of **Delphacodes idonea** Beamer.
18a. Caudal view of styles and aedeagal brace of **Delphacodes idonea** Beamer.
18b. Lateral view of aedeagus, enlarged. of **Delphacodes idonea** Beamer.
19 Lateral view of genital capsule of male of **Delphacodes angulata** Beamer.
19a. Caudal view of styles and aedeagal brace of **Delphacodes angulata** Beamer.
19b. Lateral view of aedeagus. enlarged, of **Delphacodes angulata** Beamer.
20. Lateral view of genital capsule of male of **Delphacodes pediforma** Beamer.
20a. Caudal view of styles and aedeagal brace of **Delphacodes pediforma** Beamer.
20b. Lateral view of aedeagus. enlarged. of **Delphacodes pediforma** Beamer.

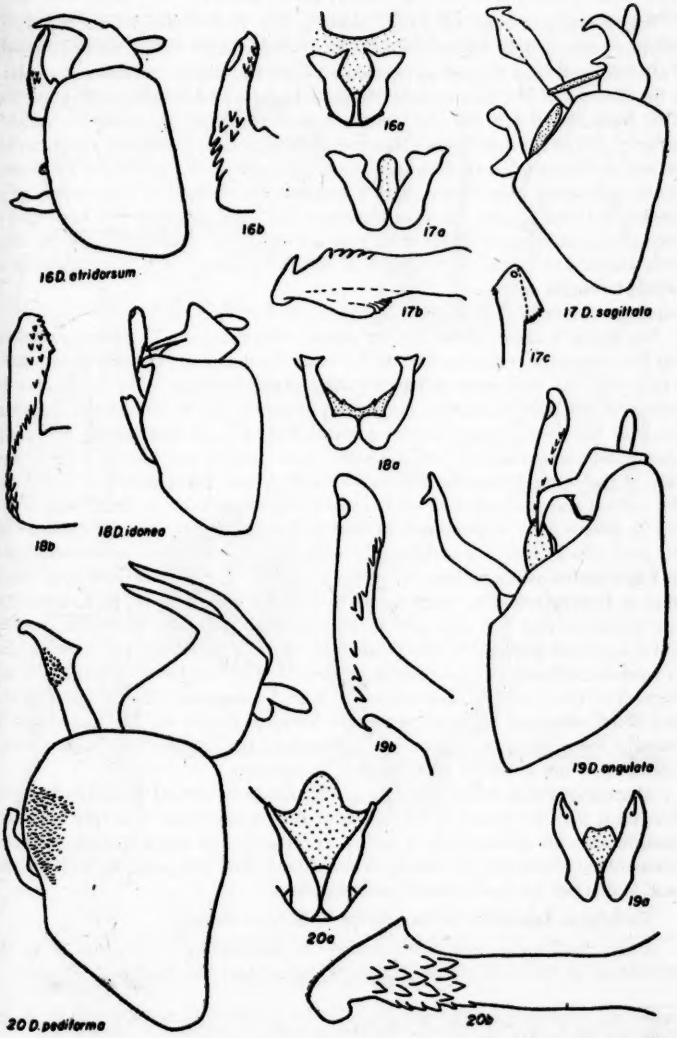
16D. atridorsum
16b
16a
17a
17b
17 D. sagittata
17c
18b
18D. idonea
18a
19b
19D. angulata
19a
20D. pediforme
20a
20b

PLATE IV

THE GENUS LEPTOPTEROMYIA (ASILIDAE-DIPTERA)

D. ELMO HARDY
Assistant State Entomologist, Ames, Iowa

This genus has been unknown since it was first described by Williston and has existed only by virtue of a brief description and a named figure. Williston[1] described the genus (nomen nudum) but did not mention a species. In his Manual of North American Diptera[2], he figured **Leptopteromyia gracilis** Will. from Brazil but did not include a description of the species. Aldrich[3] designated this species as the genotype. One year later Hermann[4], apparently having no knowledge of Aldrich's paper, designated **L. willistoni** Hermann as the genotype. This was merely a designation without a description of a species. It is not known whether Hermann had seen specimens of **Leptopteromyia** from Mexico or whether he just assumed that Williston's species was from there. The writer is unaware of the existence of any description of a **Leptopteromyia** species.

Leptopteromyia Williston, 1907, Journ. N. Y. Ent. Soc., 15:1.

The genus is characterized by its unsual wing venation. The wing possesses but four posterior cells instead of the usual five as in most other Leptogastrinae and the anal vein is lacking. The genus appears to be most closely related to **Eurhabdus** Aldrich but the wing base is not so attenuated and vein Cu, and the m-cu crossvein are present (fig. 1d). In **Eurhabdus** the wing base is attenuated into a long hair-like stalk, nearly one half as long as the rest of the wing. The subcosta and vein R_{1+2} are fused with the costa and the cubital and anal veins as well as the m-cu crossvein, are completely lacking. It differs from **Leptogaster** in having the media but three branched and the anal vein and cell are lacking. The wing base is much more attenuated than in **Leptogaster** owing to the loss of the anal cell. The halteres are very elongate in **Leptopteromyia,** being equal in length to the thorax. In **Leptogaster** the thorax is one and one half to two times longer than the halteres. The third antennal segment is about one and one half times as long as wide and is rounded apically. The antennae possess slender subdorsal aristae (fig. 1c) instead of the thick two-jointed styli as in **Leptogaster.** In the latter group the third antennal segment is rather slender, tapers to the apex, and is usually three times as long as wide. The style is thick, its base is as wide as the apex of the antenna, and is apical in position.

Hermann[4] did not feel that this genus should be set off from **Leptogaster.** He states that the absence of a posterior cell in the wing is hardly sufficient justification for establishing a genus. In view of the above-mentioned supplementary characters, however, it is obvious that this genus is well defined and is distinct from all other Leptogastrinae.

Genotype: **Leptopteromyia gracilis Will.** from Brazil.

Type apparently lost. Dr. Carrera is designating a neotype from the collection of the Institute de Experimentacao Agricola de Rio de Janeiro.

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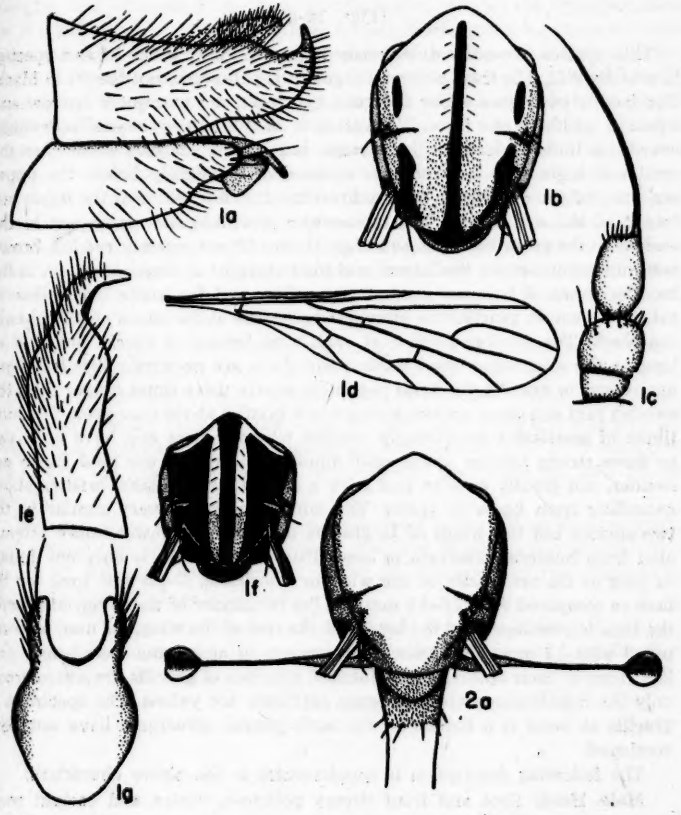
[1]1907, Journ. N. Y. Ent. Soc., 15, p. 1.
[2]1908, 3rd Ed., p. 195, fig. 35.
[3]1923, Proc. U. S. N. Mus., 62, p. 3.
[4]1924, Verh. der Zool.-Bot. Ges., 74; 143.

Dr. Messias Carrera, of Sao Paulo, recently loaned the writer a specimen from Rio de Janeiro for comparison with the below-described North American species. Carrera is redescribing the genus and **L. gracilis** Williston and is publishing information on the biology of this species. He reports that Dr. Hugo de Souza Lopes found them living on **Embia** (Embioptera) nests. Except



Explanation of Figures

Fig. 1. **Leptopteromyia americana** n. sp. a. lateral view of male genitalia; b. thorax of female; c. antenna; d. wing; e. left side of ninth tergum of male; f. thorax of male; g. ninth sternum of male.

Fig. 2. **L. gracilis** Williston. a. thorax of female.

for the below-described new species the specimens which Carrera is reporting on are the only known records of the genus since its original description. Hermann may have seen material from Mexico but apparently never published such records.

Leptopteromyia americana n. sp.
(Figs. 1a-g)

This species is readily distinguished from the only other known species, **L. gracilis** Will. The third antennal segment is yellowish; not brown to black. The face is two times wider than one eye facet; not extremely narrow and equal in width to one facet. The vertex is broad, in area of ocellar triangle over three times wider than the triangle; not narrow, scarcely wider than the ocellar triangle. The antennae are situated at or slightly below the upper one third of the eye height, from a direct frontal view; not near the upper one fourth of the eye height. The mesonotum is vittate and pubescent in the middle on the posterior third, as in figs. 1b and 1f; not entirely reddish brown and pubescent just on the lateral and hind margins of mesonotum, as in fig. 2a. The stems of halteres are entirely yellow and the knobs are yellow to yellow brown; in **gracilis** the attenuated portions of the stems and the knobs are black. The swollen portion of each hind femora is nearly one half as long as the attenuated basal portion and there are no strong bristles above near apex; in **gracilis** the basal portion is nearly three times longer than the swollen part and there are two strong black bristles above near apex. The hind tibiae of **americana** are strongly swollen toward apices and have only two or three strong bristles above near middles; in **gracilis** the hind tibiae are slender, not greatly swollen and have a row of strong black, bristles above extending from bases to apices. The wing venation is very similar in the two species but the wings of **L. gracilis** are much narrower, more attenuated from humeral crossvein to base. This basal portion is only one fourth as long as the remainder of the wing in **americana**, .7-1.0 mm. long for the base as compared with 2.8-4.0 mm. for the remainder of the wing; in **gracilis** the base is over one third the length of the rest of the wing, 1.5 mm. as compared with 3.7 mm. The abdominal segments of **americana** have broad yellow rings at their apices; the abdominal sclerites of **gracilis** are unicolorous, only the membranous areas between segments are yellow. The specimen of **gracilis** at hand is a female so the male genital structures have not been compared.

The following description is supplemental to the above characters:

Male. Head: Face and front silvery pollinose, vertex and occiput more distinctly grayed. Mouthparts and antennae (fig. 1c) yellow. **Thorax:** Chiefly polished brown to black in ground color, with two median yellow vittae. Humeri, front margins of mesonotum and hind margin of scutellum yellow (fig. 1f). Some specimens showed considerable variation in the arrangement of the dorsal vittae. Scutellum, hind part and sides of mesonotum rather thickly whitish pubescent. Dorso-central hairs present but weak. Mesonotum with two strong bristles on each side ,one just in front of the

suture and one just before the posterior calli. Thorax scarcely one and one half times as long as the head and equal in length to the elongate halteres. **Legs.** Chiefly yellow, hind femora and tibiae strongly clavate and with broad brown to black rings just before their apices. Apical subsegments of tarsi blackish. Empodia well devolped, extending about three fourths the length of the tarsal claws. **Wings:** Venation as in figure 1d. **Abdomen:** Very long, slender, and attenuated, the basal portion not as wide as the enlarged apices of the hind femora. Abdomen chiefly shining black, posterior portion of each segment with a broad yellow ring, posterior portion of abdomen faintly reddish. First segment with a ring of six to eight strong bristles near base, remainder of segments conspicuously clothed with short dark hairs. **Hypopygium:** Yellowish red in color with the apices of ninth tergum blackish. The ninth sternum has a U shaped concavity in middle on hind margin, the apices are produced into a pair of rather slender lobes which bear long bristles (fig. 1g). The ninth tergum is cleft to its base, divided into two lobes, these are strongly curved inwardly and pointed at apices (fig. 1e). Aedeagus with very complex accessory structures, which are bilobed, and each has a slender finger-like projection as seen from a lateral view (fig. 1a). Cerci rather elongate, longer than wide. Anal segment well developed. **Length:** Body 6 - 6.6 mm.; wings, 3.6 - 4.0 mm.

Female: Very similar to the male except that the mesonotum is chiefly yellow with three black vittae or with the lateral vittae each divided into two elongate spots as in fig. 1b. **Length:** Body, 8.0 - 9.0 mm.; wings, 5.0 - 5.6 mm.

Holotype male: Hidalgo, Tex., Dec. 28, 1945, (R.H. Beamer). Allotype female and five male and six female paratypes, same data as type, three additional paratypes, one male two females, Brownsville, Tex., June 29, 1938 (R. H. Beamer).

Type, allotype and eight paratypes returned to the Snow Entomological Collections, two presented to the U. S. National Museum, one presented to Dr. S. W. Bromley, one presented to Dr. M. Carrera, and two retained in the Iowa State College Collection.

Dr. Beamer reports that the series of specimens from Hidalgo, Tex., was taken in association with large numbers of Aleyrodidae and that the flies were evidently feeding on these insects.

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